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REPORT
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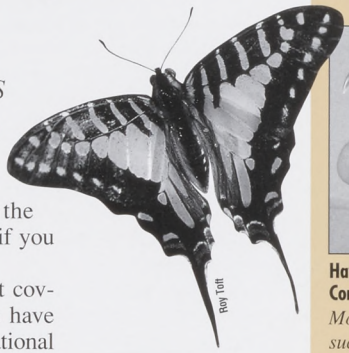
Ghost Island: Protecting Madagascar's Incredible Biodiversity

William Toone, Conservation Project Specialist, Ecology and Applied Conservation Division/CRES

Flying over the island of Madagascar, one sees a spread of crimson topsoil on the sea. This is the effluence of its rivers into the Indian Ocean that has washed off Madagascar's deforested mountains. It is as though the island were bleeding away from unchecked wounds, as if you were actually witnessing the death of an ecosystem.

In several decades of *in situ* conservation projects that covered dozens of developing countries, CRES biologists have encountered the most fascinating spectacles that international cultures and wildlife have to offer. Yet there is no place like Madagascar. Here the word biodiversity acquires new meaning, ecological disaster is the norm, and intervention from outside conservation organizations becomes a drive to save the environment *for* the people, not *in spite of* them. The biological affluence of this isolated island, unique in the large numbers of its endemic species, juxtaposes starkly against the poverty of its human inhabitants: people who are now destroying one of the world's natural wonders as they harvest its resources in a desperate struggle for their own survival.

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Roy Toft

Yet there is no place like Madagascar.



Roy Toft

Living almost exclusively on a rice diet, these girls are gleaning valuable protein from the river in the form of insect larvae and small crustaceans caught in their reed nets.

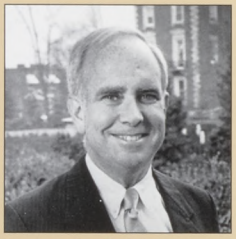
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Hawaii Endangered Bird Conservation Program
More captive-breeding success stories. See page 3.



Cameroon Project on Drills
Africa's most endangered primate is part of CRES study. See page 4.



Conservation Medal Award Dinner
Meet renowned botanist Dr. Peter Raven. See page 5.

Ghost Island: Protecting Madagascar's Incredible Biodiversity

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It was for this reason that the Zoological Society of San Diego, in collaboration with the Wildlife Conservation Society, CARE International, and the Malagasy government, sent me to Madagascar. As a conservation program specialist with the ecology and applied conservation division of CRES, I worked in and around the remote village of Antanambao on the Masoala Peninsula. One of only a few *vazaha*, or foreigners, to have visited the village, I am the only *vazaha* to work there. In this remotest of areas, visitors were unheard of until recently, but work to establish this rain forest community as a national park is changing all that. As a *vazaha*, my arrival was met with uncertainty. Where I bathed and where I camped were issues within the community. I was accepted ever so slowly and then finally embraced in a profound way.

From 1997 to 1999, my work centered on teaching butterfly ranching as a sustainable resource use while investigating other conservation opportunities. Never before had the people associated caterpillars with butterflies, and the phenomenon totally surprised them. A women's group was formed, and they were taught to harvest butterfly eggs from host plants, as well as to protect and rear them until they completed metamorphosis and became adult butterflies. Protective rearing of the larvae enhances survivability to the point that butterflies can be released back to the wild, in addition to those harvested for sale to collectors or butterfly displays such as Hidden Jungle at the Wild Animal Park. They are taught that this harvest of butterflies is closely linked to a healthy rain forest. The ability to sell these butterflies then confers an economic value to a standing rain forest rather than seeing it only as a commodity that needs to be cut and stacked for export. There is more than one way to receive economic benefits from rain forest trees.

Then on April 3, 2000, cyclone Hudah pummeled the east coast of the Masoala Peninsula. Vast expanses of forest, the village of Antanambao, and many other villages were obliterated. Lives were lost and homes and food supplies destroyed. In ecological trouble spots, biological science is not always the best and immediate answer. Sometimes it is the social sciences—politics, education, and economics—that are best applied to reach a solution. In the case of Masoala National Park, the immediate needs were those with which I have dealt before, in such Zoological Society projects as butterfly farming in Costa Rica and ecotourism in Mexico: they were economic.

Schools and park ranger housing were destroyed by the storm.



Roy Toft

The author teaches villagers how to set up an enclosure for rearing butterfly larvae.

The first step toward recovery of the Park's local protection system was to ensure that staff members would lead secure lives after the storm's devastation, with their homes and offices rebuilt. CRES provided funds through the Wildlife Conservation Society to rebuild 57 homes belonging to park rangers. The Zoological Society's education department contributed funds through CARE International to rebuild an elementary school that will provide basic education to several small villages, including the relocated village of Antanambao.

This is a place so innocent as to inspire love, but so troubled as to leave you despondent over a collision between wildlife needs and humans needs that threatens to destroy both. The challenges are huge, the solutions difficult and often elusive, but the Zoological Society and its colleagues are there because, in this desperate conflict, we still see hope for compromise and resolution. Madagascar and its abundant, wonderful biodiversity and people are worth the effort.



Sunni Black

Using Gifts to Protect the Forests

There are many sustainable resource opportunities to be explored and developed on the Masoala Peninsula. The extraction of essential oils from the leaves of tropical trees is worthy of investigation; these oils are popular in aroma therapies and as additives to many personal care products. Also important is the trade in raffia, a palm common to the world's tropical regions. The fibers of this palm are widely used, woven into raffia mats, hats, purses, and sandals. The fibers of Malagasy raffia are more highly prized internationally than those from any other region. The planting of raffia palms and sustainable harvest of fronds fits nicely with the traditional agricultural life-style in small villages like those found on the Masoala, and this could bring much needed resources to the communities. The point, again, is not to deny the local people's use of surrounding resources, but rather to help direct them to economic pursuits that are friendlier to the environment.


Alan Lieberman

This male crested honeycreeper, or 'akohekohe, was the first of its species to be hatched in captivity. The egg was collected in the wild in1997, then artificially incubated at the Maui Bird Conservation Center. After being hand reared, this chick and four others were sent to the Keauhou Bird Conservation Center, in the hope that they would soon breed there.

Extraordinary Success: The Hawaii Endangered Bird Conservation Program

Breeding birds in captivity for reintroduction to the wild is controversial, and yet this is a recovery strategy for preventing extinction of endangered birds. At the root of the controversy is the uncertainty of success, because the development of restoration techniques is still in its infancy. This is especially true for those species that are considered difficult to maintain and breed in captivity: the songbirds. Delicate, ephemeral species, songbirds are complex in their behavior, social structure, nutrition, and avicultural requirements. Breeding songbirds in captivity to reestablish self-sustaining wild populations remains a challenge.

Hawaii has the unenviable distinction of having more endangered bird species than the entire continental United States. This is a result of introduced avian diseases (malaria and pox), alien predators (rats, mongooses, cats), and destruction of the native Hawaiian forests. Since 1993 and based on their experience with peregrine falcons, California condors, and San Clemente Island loggerhead shrikes, two organizations have taken the lead in developing and implementing the techniques required to ensure success in all aspects of the captive management of Hawaii's endangered songbirds: initially, The Peregrine Fund, and then the Zoological Society of San Diego. This includes the collection of wild eggs, artificial incubation, hand rearing, long-term captive maintenance, captive breeding, and releasing and monitoring captive-reared birds back into managed, secure habitat. Prior to 1993, avicultural efforts with Hawaiian birds have been scant. Supported by funding from the U.S. Fish and Wildlife Service, the Hawaii Division of Forestry and Wildlife, and private funding, the Hawaii Endangered Bird Conservation Program has made significant progress in establishing the avicultural techniques to support the recovery of Hawaiian forest birds.

In 1995, a small, state-of-the-art songbird propagation facility, the Keauhou Bird Conservation Center (KBCC), was constructed near Volcano on the big island of Hawaii. The program also operates the Maui Bird Conservation Center at Olinda on Maui. Beginning with the development of restoration techniques to collect, incubate, and rear the common 'amakihi in 1994, the program has gone on to incubate and hatch more than 250 chicks of endemic Hawaiian forest birds. The artificial incubation of eggs and hand rearing of chicks has resulted in 90 percent hatch rates and 84 percent survival rates. This level of success is extraordinary and is well beyond the propagation records of comparable endeavors at zoos, bird parks, and private collections.

The puaiohi is an example of the program's success with captive breeding of an endangered species, with 43 chicks bred at the KBCC. Of these, 34 have been released in the native forest of the 'Alaka'i Swamp on Kauai between 1999 and 2001. Further, it has been documented that over 90 percent of these release birds have survived to independence, an incredible figure that illustrates just one success within this program. In 1999, the first year of release, there were 21 nesting attempts within six months of release, producing 8 successful fledglings. This is the first recovery program for an endangered songbird that has successfully incorporated aspects of wild-egg collection, artificial incubation and hand rearing, captive breeding, release, and the final measure of success, reproduction in the wild.

The outstanding success of this propagation-and-release program is a clear demonstration of the contribution such captive-management efforts can lend to endangered species recovery, not only for Hawaii's forest birds but also for recovery of similar species worldwide. Steps taken to save small species such as songbirds also can lead the way to other major conservation strategies within a threatened ecosystem. But only consistent and continuous support for the captive propagation-and-release effort, in addition to accompanying efforts to preserve native habitat, will stem the tide of extinction in Hawaii.

Alan Lieberman and Cyndi Kuehler, Program Directors, Hawaii Endangered Bird Conservation Program/ Zoological Society of San Diego


Alan Lieberman

This Maui parrotbill chick, another critically endangered songbird, also was the first of its species ever hatched in captivity.

Our thanks to the staff members of the Hawaii Endangered Bird Conservation Program: Stephen Bailey • Suzanne Chacon • Jenny DiMiceli • Peter Harrity • Joop Kuhn • Marla Kuhn • Lynne Neibaur • Paul Oesterle • Elaine Pahio • Tracey Powers • Mary Schwartz • Carolyn Stephens • Valerie Walsh

Drills and Rain Forest Conservation in Cameroon

If someone is asked to name the most endangered primate species in Africa, they would probably say "the gorilla," or "the bonobo," or "the chimpanzee." However, this dubious distinction belongs to the drill, a large, baboon-like monkey species which occurs only in Cameroon, Nigeria, and on the island of Bioko. Drills occur in rain forests to the north of the Sanaga River, while the closely related mandrill is found to the south in Gabon, Rio Muni, and adjacent areas. These are the largest monkeys in the world; an adult male can weigh over 30 kilograms (66 pounds) and is three times the size of the adult female.

Despite their size and formidable appearance, both drills and mandrills have rarely been studied in their natural habitat. Their home ranges are enormous, exceeding 30 km^2 (about 11.5 mi^2) in the case of the mandrill, and groups consist of hundreds of monkeys which travel rapidly on the rain forest floor and forage or sleep in the trees. These big groups (the largest mandrill group recorded contained 1,000 monkeys) sometimes split into smaller units, each containing a large adult male, with 20-30 females and offspring. There has been a tendency to think of these as "harems" or "one male" units. In reality, field information on mandrill behavior and reproduction is too limited to be dogmatic about their mating system, and information on drills is almost nonexistent.

If we are to learn about these animals in the wild, time is running out. Rain forest destruction, due to commercial logging as well as hunting for the "bushmeat" trade, has greatly reduced the number of drills in Nigeria and Cameroon. On the island of Bioko, they are almost extinct. Drills and mandrills tend to take to the trees when alarmed, and hunters with dogs find it relatively easy to drive them into the trees and shoot them.

During 2000, the Zoological Society initiated a field program to assess the status of drill populations in Cameroon and to gather information on behavior and reproduction. Our field manager for this project is Christopher Wild, who has 10 years experience working on conservation projects in Cameroon. Negotiations are in progress to register the Zoological Society of San Diego as a non-governmental organization (NGO), engaged in a collaborative program of "Technical Assistance on the Research and Conservation of Endangered Species and Natural Resources in Cameroon." Major forests, including the Makombe Forest in central Cameroon, have been nominated by the Cameroonians as new logging concessions. Our hope is that they will delay any final decisions until we have had an opportunity to survey drill populations in the most important areas. This work will be a priority for 2001. Joining Chris Wild in Cameroon is Dr. Joanna Setchell, who obtained her doctorate by studying the behavior and reproduction of mandrills in Gabon.



We are confident that knowledge obtained from studying mandrills will also be useful in understanding the biology of free-ranging drills. Cameroon is a repository of amazing biodiversity: its rain forests contain substantial populations of gorillas, chimpanzees, forest elephants, slender-snouted crocodiles, goliath frogs, and other amazing creatures. I am delighted that the Zoological Society has initiated a field program to conserve primates and rain forest herpetofauna in Cameroon.

Alan Dixson, Ph.D., D.Sc., Director of Conservation and Science/Zoological Society of San Diego

CRES Grants

The Center for Reproduction of Endangered Species is grateful to generous donors for their support of imperiled wildlife.

Recent grants in support of the **Arnold and Mabel Beckman Foundation's** challenge grant to construct a new CRES facility at the Wild Animal Park were made by the **Warner Family Foundation**, the **Caesar Kleberg Foundation for Wildlife Conservation**, and the **Hollis Foundation**. A grant to assist the CRES Endowment was given by the **Muchnic Foundation**.

Several generous donors answered the call to provide equipment and scientific instruments critical to our success. The scientific detective work of the CRES pathology division will be greatly enhanced with equipment donated by the **John P. Scripps Foundation**, the **Guilford Whitney Foundation**, and the **Burnham Foundation**. Vital information will be gained with the purchase of a genetic analyzer funded by the **Walton Family Foundation**, the **American Foundation**, **John and Lois Klaas**, **Sis Andrews**, **Carol Quinn and David Mayo**, and an **anonymous donor**. A projector for CRES educational programs was made possible by **TRW, Inc.** Hormone analysis in the CRES endocrinology division will be enhanced by a grant from the **Robert and Lillie Breitbard Foundation**. The CRES virology division gained needed items provided by the **Cruffel Foundation**, and investigations in reproductive physiology will benefit from equipment made possible by the **Virginia Friedhofer Charitable Trust**. The health of ecosystems will be understood more fully with grants by the **Joan Irvine Smith and Athalie R. Clarke Foundation** and the **Alphonse Burnand Medical and Educational Foundation**.

Program funding by the **L. J. and Mary C. Skaggs Foundation** will assist endangered carnivore research in the reproductive physiology division. A grant from the **Morris Family Foundation** will encourage habitat conservation through sustainable development in Madagascar, and a grant from the **Money-Arenz Foundation** will assist in local habitat conservation by seed banking through the CRES ecology and applied conservation division.

An Evening with the 2001 Conservation Medalist

Championing the environment and fighting to preserve endangered plants and biodiversity began at an early age for Peter Raven, the Zoological Society's Conservation Medalist for 2001. When he was 8 years old, he became the youngest student member of the California Academy of Sciences, and by age 16, he had identified a new plant species. Now one of the world's leading botanists and evolutionary biologists, Dr. Raven has spent the past three decades as director of the Missouri Botanical Garden in St. Louis. During the late 1960s, Peter Raven and other colleagues became concerned about plant extinction, which led to a determination to save ecosystems and achieve global sustainability. Dr. Raven continued in his worldwide efforts to protect the environment while serving as a member of President Clinton's Committee of Advisors on Science and Technology. In December 2000, he was also one of the recipients of the National Medal of Science, the nation's highest scientific honor, and he was named a "Hero for the Planet" by *Time* magazine in 1999.

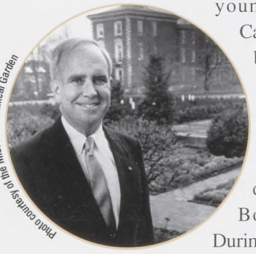


Photo courtesy of the Missouri Botanical Garden

Under Dr. Raven's direction, the Missouri Botanical Garden has become a leader in botanical research, and he has also led and encouraged research in Latin America, Africa, and Asia. The noted botanist believes that an international commitment to bring vulnerable plant species into cultivation in botanical gardens and seed banks could avert the possible extinction of thousands of species. "If you are going to give a valuable present to the people 100 years from now," he says, "then saving all the plants might be a very good way of doing it."

The Zoological Society of San Diego is proud to name Dr. Raven as its 2001 Conservation Medalist and to host a dinner in his honor on Friday, April 6, 2001, at The Prado at Balboa Park. Tickets are $65 per person. For reservations or further information, please call (619) 231-1515, extension 4199.

Special Speakers: Field Conservation Projects

Find out how friends and members of the Zoological Society of San Diego help support conservation projects around the world. This Special Speakers series at the Zoo brings experts in the field to give you in-depth information about what it is like to help animals in the wild.

Hawaii's Endangered Songbirds leads off the three-part series on Wednesday, April 25. Alan Lieberman, director of the Hawaii Endangered Bird Conservation Program and former curator at the San Diego Zoo, will talk about the challenges and rewards of raising and releasing these rare birds.

Bill Toone, conservation program specialist for the Zoological Society, will speak about **Butterfly Farming in Madagascar** on May 23. He'll share fascinating tales about living with and teaching the local people to use this sustainable natural resource.

The series concludes on June 20 with **The Peccaries of Paraguay**. The Zoological Society's reintroduction specialist, Mike Wallace, will discuss the steps taken to study, preserve, and increase the population of peccaries in the Gran Chaco region.

All three programs will include a slide presentation, question-and-answer period, cookies, and a hot beverage. The fee for each Special Speakers program is $12 per person, ages 12 and up, or take advantage of the series price of $30 for all three programs when booked at the same time. Each program takes place at the San Diego Zoo's Otto Center auditorium from 7 to 8:45 P.M. Reservations are required—call (619) 557-3969 for a brochure and registration form.

Cans for Critters 2001!

Cans for Critters is celebrating its 21st anniversary in 2001! Join this fun and educational recycling program that enables all the public to actively contribute to securing the future of endangered animals. Participants receive prizes for recycling aluminum cans and are invited to participate in the Cans for Critters Jamboree hosted at the San Diego Zoo. Proceeds from the program directly benefit CRES in its research projects aimed at improving the chances of survival for many threatened animals.

cans for critters®

For more information on what your organization, school, troop, or company CAN do to help CRES and the environment, please call Tamara Langmead at (619) 744-3362. The program can be tailored to your individual needs. This year's school recycling drive began in February and runs through April 30, with the Jamboree on May 11, 2001.

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It's never too early to get an estate plan in place and avoid having the state make those important decisions for you. When creating your plan, please consider a gift to the Zoological Society of San Diego to benefit our conservation branch, the Center for Reproduction of Endangered Species (CRES). Your legacy to CRES will enable us to continue our vital worldwide wildlife conservation efforts for future generations. In addition, charitable gifts can reduce your potential estate and income taxes, and they may be designed to provide you with income during your life. Please contact the development office at (619) 231-1515, extension 4243, for more information.



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CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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